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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/666,523

09/22/2003

Luc Wolff

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EXAMINER

SINGH, PREM C

ART UNIT

PAPER NUMBER

1764

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

01/19/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/666,523

Applicant(s)

WOLFF ET AL.

Examiner

Prem C. Singh

Art Unit

1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 November 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 38 is/are allowed.
- 6) ☒ Claim(s) 21-37, 39-42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/30/2006 has been entered.

Claim Objections

2. Claim 21 is objected to because of the following informalities:

Claim 21 (Page 3, first paragraph): after orthoxylene --"."-- should be replaced by --";"--.

(Page 4, first line): after (5) --"."-- should be replaced by --";"--.

(Page 4, paragraphs 2, 3, 4): --"."-- should be replaced by --";"--.

Page 4, paragraph 5): after "produced" --"."-- Should be replaced by --"; and"--.

Claim 24 is objected to because of the following informalities:

Claim 24 recites stream (7c) between stream (7b) and stream (5) which is not supported by either figure 1 or 2.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 25 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "essentially" in claim 25 is a relative term which renders the claim indefinite. The term "essentially" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

The term "essentially" should be clarified.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 21-37, and 39-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Magne-Drisch et al (US Patent 6,369,287) in view of Lee (US Patent 3,306,942).

9. With respect to claims 21 and 22, Magne-Drisch invention discloses a process for co-producing ethyl benzene and paraxylene, which comprises the following steps:

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A feedstock that is provided via a supply line (1) and comprises a mixture of p-xylene, o-xylene, m-xylene, and ethyl benzene is introduced into a first adsorption unit (2). This unit comprises chromatographic columns that are filled with an adsorbent, and it operates according to the principle of a simulated counter-current moving bed. Said unit comprises four chromatographic zones. A raffinate that consists essentially of o-xylene and m-xylene and ethyl benzene and desorbent is recovered via a line (3). The desorbent which is toluene that is introduced via a line (6a) makes it possible to desorb via a line (4) an extract that consists of essentially pure p-xylene and toluene that is distilled and recycled (not shown in the Figure) (See column 5, lines 9-22). The raffinate is sent via line (3) into a distillation column (5) which feeds a toluene distillate via a line (6) that is optionally recycled and a residue. The latter is introduced via a line (7) into a second adsorption unit (8) that operates as first unit (2), according to the principle of the simulated countercurrent moving bed. A raffinate that contains desorbent and m-xylene and o-xylene is drawn off via line (10) while an extract that contains basically essentially pure ethyl benzene and desorbent is desorbed by the toluene that is introduced via a line (12 a). This draw-off is carried out via a line (9) downstream from the line for introducing desorbent into unit (8) (See column 5, lines 23-37). The raffinate is sent into a distillation column (11) that feeds a toluene distillate via a line (12) and a residue of o-xylene and m-xylene via a line (13). At least a portion of this residue can be introduced into a distillation unit (18) via a line (17). Said unit (18) makes it possible to recover an essentially pure m-xylene distillate via a line (19) and an essentially pure o-xylene residue via a line (20). The other portion of the residue is sent into an isomerization unit

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that operates with or without hydrogen that is introduced via a line (15). The isomerate that is collected via a p-xylene-enriched line (16) essentially contains no ethyl benzene and is mixed at line (1) (See column 5, lines 39-54). Also, preferably by a standard method that is not shown in the figure, at least some of C₉+ compounds are eliminated from the isomerate (See column 5, lines 56-59).

It is to be noted that Magne-Drisch invention does not specifically mention about a distillation column (2) as claimed, but the invention does mention separation of C₉+ compounds from the isomerate which eventually becomes feed for the adsorption unit. Thus, it would have been obvious to one skilled in the art at the time then invention was made to modify Magne-Drisch invention and add a distillation unit before the adsorption step as claimed to eliminate C₉+ compounds.

Magne-Drisch invention discloses that the ethyl benzene production line is generally integrated into a plant for producing styrene (See column 2, lines 35-37), but it does not disclose dehydrogenation step of ethyl benzene to styrene.

Lee invention discloses an improved process for the dehydrogenation of alkyl aromatic hydrocarbons such as ethylbenzene to styrene (see column 1, lines 9-12).

Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify Magne-Drisch invention by including a dehydrogenation step as suggested by Lee and take the stream (9) consisting of 99% pure ethylbenzene (See column 8, line 26) and convert it to styrene to make the process more profitable and useful due to numerous applications of styrene.

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10. With respect to claim 23, Magne-Drisch discloses, "A raffinate that consists essentially of orthoxylene and metaxylene and ethyl benzene and desorbent is recovered line (3). The desorbent which is toluene that is introduced via line (6a) makes it possible to desorb via a line (4) an extract that consists essentially of pure paraxylene and toluene that is distilled and recycled (not shown in the figure)." (Column 5, lines 17-23).

11. With respect to claim 24, Magne-Drisch discloses in the figure adsorption column (2) operating in 5 zones. The figure showing streams (3), (3a), (4), (6a), and combination ((1) and (16)) of Magne-Drisch respectively represent the claimed streams (7c), (7b), (7a), (5), and (3).

12. With respect to claim 25, Magne-Drisch discloses in the figure where the first raffinate product (3a) is distilled in distillation column (11) to eliminate toluene (12), and then taken to the isomerization zone (14). The second raffinate product (3) goes to the distillation column (5) to remove toluene (6) and then to the second adsorption column (8). It is to be noted that stream (3) comprises essentially of orthoxylene, metaxylene, ethyl benzene, and toluene. Although the figure does not show a dehydrogenation unit, since the stream contains ethyl benzene, it would have been obvious to one skilled in the art at the time the invention was made to modify Magne-Drisch invention and take the stream (7) to a dehydrogenation unit to convert ethyl benzene to styrene to make the process more profitable by producing styrene.

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13. With respect to claims 26 and 27, Magne-Drisch discloses the adsorbent used in the first adsorption column to be X zeolite exchanged with barium or a Y zeolite exchanged with potassium and barium (See column 4, lines 43-45) and titanasilicate containing adsorbent in the second column (See column 4, lines 66-67).

Although Magne-Drisch does not disclose using X or Y zeolites in the second adsorption column but it would have been obvious to one skilled in the art at the time the invention was made to modify Magne-Drisch invention and use X or Y zeolites because they are functionally similar to the adsorbent disclosed by Magne-Drisch.

14. With respect to claims 28 and 29, Magne-Drisch discloses the desorbent of the first and second adsorption columns as toluene or paradiethylbenzene (See column 4, lines 39 and 58).

15. With respect to claim 30, Magne-Drisch discloses the volumetric ratio of desorbent to feedstock for the first adsorption column = 1-2 and for the second adsorption column = 1-3 (See column 4, lines 36-37 and line 59).

16. With respect to claim 31, Magne-Drisch discloses the first adsorption temperature = 100-200°C and pressure = 2-30 bar (See column 4, lines 34-35).

17. With respect to claim 32, Magne-Drisch discloses the second adsorption temperature = 100-200°C and pressure = 2-30 bar (See column 4, lines 56-57).

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18. With respect to claim 33, Magne-Drisch discloses that the first adsorption column contains 6-24 number of beds (See column 4, line 38) and 4 zones (see column 5, lines 15-16). Thus clearly, each zone has more than 3 beds.

19. With respect to claim 34, Magne-Drisch discloses that the second adsorption column contains 6-24 number of beds (See column 4, lines 53-54) and 4 zones (See column 5, lines 31-32).

Although Magne-Drisch does not specifically mention the number of beds in the second zone, but it would have been obvious to one skilled in the art to keep required number of beds, including the number as claimed, in the second zone for an effective separation.

20. With respect to claim 35, Magne-Drisch discloses, "A process for separation of p-xylene by adsorption (US 2,985,589 and US 3,626,020), whose effluents are p-xylene, on the other hand, and an aromatic C8 fraction that is substantially free of p-xylene, on the other hand. Crystallization can be combined with the adsorption stage to obtain p-xylene that is more pure." (Column 1, lines 13-22).

Although Magne-Drisch does not disclose the details of the crystallization process and recycle of mother liquor to the separation column, it would have been obvious to one skilled in the art at the time the invention was made to modify Magne-Drisch invention and recycle the mother liquor to enhance the production of paraxylene.

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21. With respect to claim 36, Magne-Drisch does not specifically mention about a distillation column (2) as claimed but suggests a separation unit before adsorption as discussed under claim 21.

Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify Magne-Drisch invention and include a distillation column before adsorption step. Also, it would have been obvious to take the separated C₉+ fractions in a distillation column for final recovery of any xylenes.

22. With respect to claim 37, Magne-Drisch discloses a separation step (8) of adsorption for stream (7) which is equivalent to the claimed step (20) for the claimed stream (18).

23. With respect to claims 39, 40, and 42, Magne-Drisch discloses in the figure stream (13) which is equivalent to the claimed stream (23b). The figure also shows stream (13) going to the isomerization zone (14) which is equivalent to the claimed isomerization zone (24).

Magne-Drisch further discloses, "Because the recycling of the isomerate that contains very little ethyl benzene in said unit leads to a reduction in the concentration of ethyl benzene of the adsorption feedstock." (Column 3, lines 25-29).

Magne-Drisch also discloses, "The process of invention can be used in liquid phase or in gas phase." (Column 7, lines 1-2).

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Although Magne-Drisch invention does not specifically mention about quantitative value of ethyl benzene, it does mention "very little", thus it would have been obvious to one skilled in the art at the time the invention was made to modify Magne-Drisch invention and use ethyl benzene content less than the claimed concentration to reduce load on the adsorption columns.

24. With respect to claim 41, Magne-Drisch discloses, "The mixture that is treated in the zone for separating xylenes (2) consists of 28 wt % fresh feedstock (line 1) and 72 wt % by weight of aromatic compounds with 8 carbon atoms that are obtained from the effluent of the isomerization zone (line 16)." Column 7, lines 40-44).

Although Magne-Drisch does not use a distillation column (2) as claimed, but as discussed under claims 21 and 36, it would have been obvious to one skilled in the art at the time the invention was made to modify Magne-Drisch invention and use a distillation column to remove C₉ and higher components from the feed prior to adsorption step.

Double Patenting

25. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by; or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir.

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1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

26. Claims 21-37, and 39-42 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of U.S. Patent No. 6,841,714. Although the conflicting claims are not identical, they are not patentably distinct from each other because:

Although the '714 claims do not include recycle of desorbent as the claimed invention, it would have been obvious to one skilled in the art at the time the invention was made to modify '714 claims and recycle the desorbent to the first adsorption column to reduce the make-up desorbent and make the process more economical;

Although '714 claims do not include dehydrogenation step, the claims do produce ethyl benzene. Since ethyl benzene is the starting material for the production of styrene, it would have been obvious to one skilled in the art at the time the invention was made to modify '714 claims and include a dehydrogenation step to convert ethyl benzene and produce styrene due to its importance as a polymer feedstock.

Allowable Subject Matter

27. Claim 38 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

A process according to claim 21 wherein second stream (23b) is hydrogenated and then conveyed to an isomerization zone, is not taught or fairly suggested in the prior art.

Response to Arguments

28. The Applicant argues that claim 1 is amended by incorporating the limitation that the content of ethylbenzene is minor compared to metaxylene and orthoxylene. As such, for reasons previously set forth, Applicants' claimed invention is clearly unobvious over the cited prior art.

The Applicant's argument is not persuasive because Magne-Drisch discloses, "The recycling of the isomerate that contains very little ethyl benzene in said unit leads to a reduction in the concentration of ethyl benzene of the adsorption feedstock." (Column 3, lines 25-29).

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29. The Applicant argues that it is error to use an Applicant's invention as the starting point and to try to piece together the invention.

The Applicant's argument is not persuasive because although Magne-Drisch does not disclose the dehydrogenation of ethylbenzene, the invention does disclose, "The ethylbenzene production line is generally integrated into a plant for producing styrene and polystyrene." (Column 2, lines 35-37). Thus, one skilled in the art will try to utilize the ethylbenzene produced in Magne-Drisch process by including a dehydrogenation unit as suggested by Lee. This additional step will convert ethylbenzene into styrene and thus adding value to the overall process.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Prem C. Singh whose telephone number is 571-272-6381. The examiner can normally be reached on MF 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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